

WHIPPING CREAM, WHIPPED CREAM AND  
METHOD FOR MANUFACTURING THE SAME

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

5           The present invention relates to whipping cream, which  
can provide whipped cream having stable foam structure with  
favorable taste and rich texture.

RELATED ART

10           Whipped cream is widely used for piping, cake and  
dessert decoration and cake and pastry fillings. Because  
of its pleasant taste and texture, whipped cream has been  
quite popular in the world.

15           Whipped cream may be prepared by whipping or beating  
cream to demulsify the cream and incorporate air bubbles  
therein. However, foam structure of whipped cream is often  
unstable and the texture or quality may be deteriorated  
with time after whipping. For example, liquid drainage is  
often observed with time after whipping.

20           In order to stabilize the foamed structure of whipped  
cream, some stabilizing agents were proposed to be added.  
For example, Japanese Patent Application Laid Open No. H09-  
37715 discloses Arabic gum as a stabilizing agent for  
whipping cream. Japanese Patent No. 3230884 discloses a  
combination of sorbitol and/or hydrogenated starch  
25           hydrolysates having a molecular weight less than 500 and

cyclodextrine. However, hydrogenated starch hydrolysates contains high molecular portion which causes a problem such as increasing cream viscosity too much.

#### SUMMARY OF THE INVENTION

5       An object of the present invention is to provide whipping cream which can provide whipped cream with stable foam structure while keeping the pleasant taste and texture of conventionally available whipped cream.

10       Accordingly, the present invention provides whipping cream comprising, a cream product and a sugar alcohol composition, wherein the sugar alcohol composition comprises 55-100 wt% of  $\alpha$ -D-glucopyranosyl-1,6-sorbitol (hereinafter, referred as "GPS-6") on a dry weight basis.

15       In a preferred embodiment of the invention, the sugar alcohol composition comprises 56-80 wt% of GPS-6. The sugar alcohol composition may further comprises 45-0 wt% of a compound selected from the group consisting of  $\alpha$ -D-glucopyranosyl-1,1-mannitol (hereinafter, referred as "GPM"),  $\alpha$ -D-glucopyranosyl-1,1-sorbitol (hereinafter, referred as "GPS-1") and a mixture thereof on a dry weight basis.

25       According to the present invention, the amount of the sugar alcohol composition to be added to the cream product is not limited and may preferably be 2.5-30wt%, more preferably, 5-25 wt% of the cream product.

Preferable cream products used in the present invention contains 25-55 wt%, preferably 35-50wt% of fat-and-oil fraction.

5 In another aspect of the invention, whipped cream obtained by whipping or beating the whipping cream of the present invention is provided. The whipped cream of the present invention represents stabilized foam structure and causes less liquid drainage than conventionally obtained whipped creams.

10 In a further aspect of the present invention, a method for manufacturing whipped cream comprising the steps of: adding the above described sugar alcohol composition to a cream product, and beating the cream product to give whipped cream. According to the present invention, the  
15 sugar alcohol composition of the present invention may be added to the cream product before or during beating the same.

In still further aspect of the present invention, an improved whipping cream or whipped cream, wherein the  
20 improvement consists of adding the above-described sugar alcohol composition to a cream product is provided.

In still further aspect of the present invention, use of the above-described sugar alcohol composition for manufacturing a whipping cream or whipped cream is provided.  
25 DETAILED DESCRIPTION OF THE INVENTION

The sugar alcohol composition of the present invention comprises one or more sugar alcohols. The composition comprises the defined amount of GPS-6 and may further comprise other sugar alcohols such as GPM, GPS-1, sorbitol and maltitol. According to the present invention, the sugar alcohol composition may be in any form including aqueous solution, powder, granule and syrup obtained by boil down the aqueous solution, and the granular or powdery composition are especially preferable since they are easy to handle.

According to the present invention, the cream product may be any of those obtained on the market as cream for whipping. That is, the cream product may be not only those defined as "cream" under Ministerial Ordinance on Ingredient Specifications for Milk and Dairy Products, Ministry of Health, Labor and Welfare of Japan but also cream products containing conventional emulsifier, stabilizer or the like. In addition, the cream product may be those obtained by substituting whole or a part of milk fat in cream with vegetable oil; or those obtained by mixing whole milk, reconstituted milk, modified milk or skimmed milk with milk fat and/or vegetable oil. Accordingly, the fat-and-oil fraction in the cream product may be milk fat, vegetable oil or a mixture thereof. Examples of vegetable oils used for preparing the cream

product used in the present invention may include, but not limited to, coconut oil, palm oil, palm kernel oil, soybean oil, canola oil and corn oil.

5 The amount of fat-and-oil fraction in the cream product used in the present invention may be in the range preferable for whipping cream, i.e. 25-55wt%, especially 35-50wt%.

10 The cream products used in the present invention may further comprise additives known to be incorporated in conventional cream products such as flavoring agents and preservatives.

15 According to the present invention, a conventional whipping cream can be improved by adding the above-described sugar alcohol composition to the whipping cream or by substituting at least a part of sweeteners in the whipping cream with the sugar alcohol composition.

20 GPS-6 used in the present invention can be prepared by hydrogenating isomaltulose, which is obtained from sucrose by means of glucosyl transferase. It may be also prepared by hydrogenation of isomaltose, which is also obtained from sucrose. GPS-6 obtained from isomaltulose is preferable for economical reasons.

25 In addition to GPS-6, GPM is also produced by the hydrogenation of isomaltulose. Further, hydrogenation of trehalulose, a byproduct of isomaltose from sugar, gives

GPS-1. Therefore, GPS-6, GPM and GPS-1 can be prepared by hydrogenating a mixture of isomaltulose and trehalulose, which is obtained from sucrose by means of glucosyl transferase.

5           The sugar alcohol composition of the instant invention comprising GPS-6 and optionally GPS-1 and GPM in the specified proportions may be prepared from thus obtained mixture of GPS-6, GPM and GPS-1 by separating the  
10           respective compound by means of a known procedure such as crystallization or chromatography, and then adjusting the proportions. The sugar alcohol composition may also be prepared from commercially available reduced isomaltulose product, such as Palatinit® (Shin Mitsui Sugar Co. Ltd., Tokyo, Japan) a product consisting essentially of  
15           approximately equimolar GPS-6 and GPM, or IsoMaltidex® (Cerestar Japan Ltd., Tokyo, Japan), in the same manner as above. The sugar alcohol composition of the invention may be prepared by simply mixing commercially available GPS-6, GPM and GPS-1 to give the above-defined proportions.

20           The sugar alcohol composition of the present invention comprises equal to or more than 55Wt% of GPS-6 on the dry weight basis.

          According to the present invention, the sugar alcohol composition comprising GPS-6 as a main ingredient will  
25           significantly suppress liquid drainage from the whipped

cream. The cream product used for manufacturing the whipping cream or whipped cream of the present invention may comprise additives which are known to be used for conventional whipping creams. For example, emulsifiers  
5 such as sucrose fatty acid ester and stabilizers such as Arabic gum. The additives may be added to the whipping cream of the present invention or a commercially available cream product containing said additives may be employed. The combined use of the sugar alcohol composition of the  
10 present invention and the additives such as emulsifiers or stabilizer may provide more stable and rich whipped cream.

The whipping cream and the whipped cream of the present invention is sweetened to a certain extent by means of the sugar alcohol composition described as above. In  
15 addition to the sugar alcohol composition, the whipping cream or whipped cream of the present invention may further comprise sweeteners other than the sugar alcohol composition to provide desired sweetness. The amount of other sweeteners may be determined based on the desired  
20 sweetness.

The present invention will be understood more readily with reference to the following examples. However, these examples are intended only to illustrate the invention and are not to be construed to limit the scope of the invention.  
25 In the following examples, "%" represent "wt%" except for

otherwise specified.

Examples 1,2 and comparative examples 1-5

Effect of sugar alcohol composition on Stabilizing Whipped Cream

5           Effects of various sugar alcohol compositions and other sweeteners on stabilizing whipped cream were compared. The stability was evaluated by the liquid drainage from the whipped creams. The less the liquid drainage rate represents the more stable foam structure of the whipped  
10 cream. The sweeteners used are shown below.

Example 1

GPS-6 preparation consisting of GPS-6 56%, GPM 32%, GPS-1 4%, Sorbitol 7% and others 1%

(Dry weight basis. "Others" includes other sugar alcohols  
15 such as mannitol)

Example 2:

GPS-6 100% (Wako Pure Chemical Industries, Ltd. Osaka, Japan)

Comparative Example 1:

20 granulated sugar

Comparative Example 2:

equimolar mixture of GPS-6 and GPM (Palatinit®, Shin Mitsui Sugar Co., Ltd., Tokyo Japan)

Comparative Example 3:

25 GPM preparation consisting of GPS-6 9% and GPM 91% (Dry



weight basis)

Comparative Example 4:

crystalline maltitol (Lesys® Towa Kaseikogyo, Tokyo, Japan)

Comparative Example 5:

- 5 Powdered sorbitol (Powdered Sorbitol-UENO®, Ueno fine chemicals Industry, Ltd., Osaka, Japan)

Method

- 10 Fresh cream (milk fat content: 47.0%, containing emulsifier: Meiji Tokachi Fresh 100, Meiji Dairies Corporation, Tokyo Japan) about 190g was put in a stainless bowl (opening diameter: 21cm) and cooled to 4°C over iced-water bath. 21g of the sweetener shown above was added to the cream and the mixture was beaten for 2 minutes with the electric mixer (#MK-H3, Matsushita Electric Industries Co.,  
15 Ltd. Osaka, Japan) until a firm peak was acquired.

- The obtained whipped cream 10g was put in a glass funnel (diameter: 50mm), the funnel was placed in temperature controlled chamber and kept at 25°C. A glass beaker(50ml) was placed under the funnel and the liquid  
20 drainage was collected. The amount of liquid drainage was measured at 1, 2 and 3 hours and liquid drainage rate was calculated by the formula below:

Liquid Drainage Rate (%) =

(Liquid drainage (g))/whipped cream (g) X 100.

- 25 The less the liquid drainage rate represents the more

stable foam structure of the whipped cream.

#### Result

Results are shown in Table 1. Those results are average value of two trials.

5        No or very little liquid drainage was observed even after 3 hours in Example 1 and 2. In comparative example 1, i.e. whipped cream admixed with granulated sugar as a sole sweetener, liquid drainage rate of more than 1% was observed after one hour. This means the whipped cream of  
10        Comparative Example 1 was unstable. In comparative examples 2-5, i.e. whipped creams with sugar alcohols other than those defined in the present invention, certain extent of liquid drainage was observed after 1 or 2 hours.

TABLE 1

15        Liquid Drainage Rates (%)

Sweeteners	Liquid Drainage Rate(%)		
	1hr.	2hr.	3hr.
Example 1: GPS-6 preparation	0.0	0.0	0.0
Example 2: GPS-6 100%	0.0	0.0	0.2
Comp. Ex. 1: granulated sugar	1.2	2.6	3.2
Comp. Ex. 2: GPS-6 50%+GPM 50%	0.0	0.7	1.4
Comp. Ex. 3: GPM preparation	0.0	0.5	0.8
Comp. Ex. 4: maltitol	0.9	1.8	2.4
Comp. Ex. 5: sorbitol	0.0	1.2	2.0

#### Example 3 and Comparative Example 6

Stabilizing effect sugar alcohol composition of the present invention when used in combination with granulated sugar

20        The foam stabilizing effect of sugar alcohol

composition used in Example 1 (GPS-6 preparation) when used in combination with granulated sugar was examined. Liquid drainage rate of whipped creams prepared according to the same manner as above using a mixture of equal amount of GPS preparation 1 and granulated sugar (Example 3) or a mixture of equal amount of crystalline trehalose (Trehalose®, Hayashibara Co., Ltd. Okayama, Japan) and granular sugar (Comparative Example 6) as sweetener.

#### Result

Results are shown in Table 2. Less liquid drainage was observed in example 3 than comparative example 6. This result means that the sugar alcohol composition used in the present invention can stabilize foam structure of whipped cream even if used in combination with granulated sugar.

TABLE 2

Effect of the sugar alcohol composition in combination with granulated sugar

	sweeteners	liquid drainage rate(%)		
		1 hr.	2 hr.	3hr.
Example 3	granulated sugar + GPS-6 preparation	0.0	0.5	0.9
Comp. Ex. 6	granulated sugar + crystalline trehalose	0.0	1.0	1.5

#### Examples 4 and 5

#### Evaluation of the taste and texture of the whipped creams

Whipped cream was prepared in the same manner as

Example 1 using sweeteners shown below. Seven people evaluated sweetness, texture and aftertaste of the whipped cream of Examples 4 and 5 respectively in comparison to the reference whipped cream, and scored on a scale of -4 to +4 by means of the scoring method. The significance of differences over the reference whipped cream was determined according to the method disclosed in Furukawa Hideko, "Oishisa wo Hakaru (Evaluation of palatability), Saiwai Shobo, Tokyo, Japan 1994".  $P < 0.05$  was considered significant.

Sweeteners used in this example are below:

Example 4

Granulated sugar 50% + GPS-6 preparation 50%

Example 5:

Granulated sugar 75% + GPS-6 preparation 25%

Reference Whipped Cream:

Granulated sugar 100%

Evaluation Criteria

Sweetness, texture and aftertaste of the whipped creams of Examples were compared to those of the reference whipped cream and scored according to the criteria shown below. In each criterion, "0" means "equal to the reference whipped cream".

Sweetness: -4 (not sweet) to +4 (sweet)

Texture: -4 (not rich) to +4 (rich)

Aftertaste: -4 (strong aftertaste) to +4 (without bad aftertaste)

#### Result

The average scores are shown in Table 3. The whipped cream of Example 4 was evaluated as less sweet, less aftertaste than the reference whipped cream. The whipped cream of Example 5 was evaluated as preferable with rich texture.

Table 3

	sweetness	texture	aftertaste
Example 4	-2.0 less sweet	0.4 no significance	1.4 less aftertaste
Example 5	-0.7 no significance	1.3 rich texture	0.7 no significance

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